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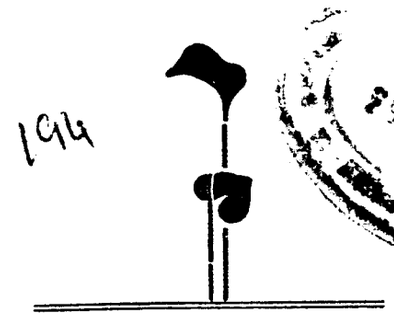

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The Madras Agricultural Journal

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ON SOIL HUMUS

By T. R. SESHADRI, M.A., Ph.D., F.C.S.

Soil Physicist

The importance of humus or organic matter for the fertility of the soil cannot be overstated. It has been at the bottom of all our agricultural methods and practice. The presence of organic matter rectified most of the physical defects of the soil producing proper tilth and right conditions of acidity and temperature. It increases the capacity of the soil for retaining moisture, a point of very great value to hot and dry tracts that are so common in India. Besides itself offering plant nutrients in an available form, it provides the necessary food and energy to the countless soil micro-organisms which bring about nitrification and other useful changes essential for the growth of the crop. The nature and the decomposition of soil organic matter is of primary importance to the Indian ryot since in his climate it disappears far more quickly than under milder climatic conditions. Most of the Indian soils are notorious indeed for their lack of organic matter.

Considerable quantities of organic matter of plant and animal origin are added to the soil year after year. The most important source is the farmyard manure. The Agricultural Department has, therefore, been carrying on widespread propaganda on improved methods of preserving and utilising it. It is an all-round manure; besides performing the ordinary functions of organic manures, it is said to supply also auximones which are as essential to plant growth as vitamins are to animals. Of almost equal importance as a source of supply of organic matter, are green manures, and much has been done to improve the quality and quantity of these. A third source which is slowly assuming greater and greater importance is the utilisation of plant waste materials and night-soil. A mixture of these two after storing for a suitable time, offer an excellent supply of manure to the soil

Though the importance of soil organic matter was realised from the very early days of agriculture, the scientific study of the subject has not yet passed the stage of infancy. The main cause is its complicated nature and the great difficulties which hamper the progress of any investigation. It is known that the organic matter added to the soil, undergoes decomposition by two main processes depending upon the conditions prevalent. The more important of the two which is characteristic of arid soils with free access to air, is the so-called decay or aerobic decomposition. By this means, most of the carbon goes off as carbon-dioxide and the nitrogen is converted into nitrates. On the other hand, under water-logged conditions as are prevalent in paddy fields, the organic matter undergoes fermentation or anaerobic decomposition. This is a comparatively slow process and the decomposition is incomplete. Various organic acids, ammonia, methane and hydrogen besides some carbon-dioxide are produced. These decompositions take place with greater or less rapidity depending upon the nature of the organic matter. Waxy and resinous coatings render plant remains very resistant as also the presence of lignified and fibrous tissues which remain undecomposed in the soil for a considerable time. Hence, some time after adding organic manure, it gives rise to various intermediate products of decomposition which are found along with the more resistant remains of the original materials. Besides these, there come in the products arising out of the synthetic activity of bacteria and fungi present in the soil. The role of these organisms may be expressed as below:

Provided the right conditions of moisture, air and light are existent, most organic materials in the world have a tendency to decompose. This process is enormously accelerated by countless invisible micro-organisms existing in the soil. They live on the humus and multiply at an enormous rate. They derive their energy from the decomposing organic matter, build up new tissues from the products of decomposition and, as they die, their cells are left behind to decay in their turn. The first result of the transformation of the naturally occurring organic matter added to the soil is the rapid disappearance of carbon, bringing about the narrowing of the C : N ratio. In the original materials it varies between 80 and 25 : 1, and as a direct result of the activities of the micro-organisms in the soil, it is narrowed down to somewhere about 10–12 : 1. It is only when this has been brought about or when the large excess of available energy over the nitrogen has been used up, that the nitrogen can be liberated in the soil in the form of ammonia, rapidly changing to nitrates, a process which determines largely the growth of the higher plants in the soil. Nitrogen is usually the limiting factor in the decomposition of fresh organic matter. When the green manure contains about 1·7 per cent. nitrogen or more, the decomposition process will be rapidly accompanied by the liberation of nitrogen as ammonia, which is soon changed to nitrate. When the nitrogen content is, however, less than 1·7 per cent, considerable time will elapse before some of the nitrogen will be liberated in a form available to higher plants. These observations explain the frequent occurrence of nitrogen starvation and the consequent ill effects on crops grown in soil which has received a fresh supply of green manure. A way out of the difficulty lies in the suitable addition of nitrogenous fertilisers so as to bring the nitrogen percentage to 1·7. Even without this treatment, the injurious effect disappears as the decomposition of the manure has proceeded far enough to narrow down the C: N ratio of the soil. The above results are very interesting in connection with the utilisation of organic residues and manures as sources of nitrogen to plants.

A review of past work in characterising soil organic matter indicates an entire lack of systematic knowledge. The presence of a number of organic compounds have been more or less definitely established in soil humus. Besides waxes and fats, organic acids such as acetic, propionic, malic, laevulinic, oxalic, succinic and hydroxy stearic acids, carbohydrates and alcohols such as pectin, pentosan, phytosterol, ergosterol and cholesterol and nitrogenous compounds such as xanthin, cytosin, histidine, arginine, leucine, isoleucine and other protein-split products along with plant and animal nucleins and chitin have been found. However, an imperfect knowledge of the organic constituents of even our common cultivated and uncultivated plants and a still more meagre knowledge of the composition of microbial cell and the nature of the products resulting from their growth and decomposition account for our ignorance of the origin of many of these organic compounds in the soil.

A GENERAL STUDY OF FLUCTUATIONS IN INSECT PEST DAMAGE

By V. TIRUMAL RAO, B.Sc. (AG.)

Assistant to the Government Entomologist.

A detailed study of the variations in the degree of insect damage under varying conditions may not only enable us to assess the value of the present state of knowledge in economic entomology, but also possibly enable us to get glimpses into new vistas of possibilities of pest-control. The rapid strides that are being made in plant-breeding to achieve results of economic importance may, for instance, lead to practical results if the entomologist were to indicate to the plant-breeder the lines on which he could help in the solution of problems of entomological interest.

Wherever a large number of varieties of a crop is under experimentation, one frequently notices much variation in the degree of insect attack. In certain cases, it may possibly be by chance that a particular variety consistently shows the same degree of damage. It is important to ascertain whether the degree of infestation exhibited is really due to any definite inherent characters by the careful elimination of external factors that sometimes bring about insect attack. It is the object of this article to indicate briefly some of the external factors that have to be taken into consideration before one can assess the true value of the powers of resistance shown by any variety, and to examine some of the inherent characters to see how far they are helpful in the repellency of attack by insect pests. In this connection it may be noted that it is no easy matter to compare varieties as regards their differences in the degree of susceptibility to insect attack, as the hatchlings do not usually confine themselves to the strips on which the eggs may happen to be laid, but get themselves distributed with little regard to the object of the observations in view.

Among the external factors, the ' time of planting ' occupies a prominent place not only because of the fact that a late-planted crop forms an attraction to pests by reason of its tenderness, but also because the delay in

planting does not give the crop the time necessary for it to recoup after the attack is overcome. It is a matter of common observation that a late-planted paddy crop generally suffers from pests like *kodu* (silvershoots) (*Pachydiplosis oryzae*) and leaf-folding caterpillars (*Cnaphalocrocis medinalis*). In the case of tobacco, the nature of damage by aphids in a late-planted crop is quite different from that in the early-planted one. In the latter, the growth requisite for harvest is completed by the leaves before aphids make their appearance, and the damage is restricted to a lowering of the quality of the leaf by the development of sooty-mould that follows in the wake of aphis attack. In a late-planted crop, on the other hand, the growth of the leaf remains incomplete by the time aphids start their damage and the attack results in the quality as well as the quantity of the leaf being affected at harvest time. As regards sugarcane, there is an indication that fields planted at the time of the approach of the South-West Monsoon have a light attack by borer (*Argyria sticticraspis*), as compared with those planted earlier in the season.

The situation of a plot also appears to have some influence in governing damage by pests. Nearness to a ratoon crop may favour some pests, the ratoons not only perpetuating internal trouble but also transmitting it to neighbouring fields. Apart from the factor of ratooning, the occurrence of previous infestation in a field may serve to shelter the pest to the detriment of the succeeding crop. Conditions like bad drainage may contribute their share to the outbreak of pests like the paddy case-worm (*Nymphula depunctalis*).

The general condition of the crop also influences damage by the pests, especially borers. As a general rule, borers appear to prefer a thin crop to a thick one. The damaged tillers, besides forming a high number for a unit of space, contribute to a rise in the percentage on account of the thin condition of the crop. It has been ascertained in the case of chillies that a certain amount of vigour created by cultural as well as by manurial operations, helps the crop a good deal in tiding over an attack by thrips.

In the case of certain crops like sugarcane and turmeric, the planting material used has a'so to be taken into consideration. Cane sets taken from a field badly infested with mealy-bugs favour the development of the pest in the new plantation. There is a similar danger in using scale-infested rhizomes of turmeric for planting purposes.

It is also a matter of common observation that the presence of a strong light near a field may favour the development of pests like the Paddy Stem-borer (*Schœnobius incertellus*), the moths attracted to the light laying their eggs in numbers in the fields roundabout.

With these preliminary observations on the subject of environmental factors influencing the incidence of insect attack, one may examine some of the inherent characters of varieties to see how far they can secure for them freedom from damage by insects and if this knowledge can be used to achieve results of economic importance.

1. *The Relative Duration of Varieties.*—In the case of the Paddy Stem-borer (*Schœnobius incertellus*), the early varieties escape damage in the Northern Circars, whereas the late ones suffer a good deal. This difference appears to be due to the fact that the numbers of the pest are greatly cut short during the summer months and it takes some time for the insect to

multiply sufficiently to turn out serious, whereas the short duration varieties come into flower before this can happen. Even among the late varieties, it is only those whose earing period coincides with the main emergence of moths that suffer most. The period of main emergence of moths varies from year to year, and cannot be definitely predicted so as to adjust the flowering time and thus enable the crop to escape damage by borer. In the case of *Dalwa*, the second crop of paddy in the Circars, a certain amount of reduction in stem-borer damage can be expected, if it were possible to shorten the growing period and thus create a definitely long gap between *Dalwa* and *Saruva* ; for, then the interval thus created would function as a natural check on the continuous breeding of the pest. In the case of the Mango, early flowering varieties like *Swarnarekha* show a high percentage of damage by hoppers, as the flowering comes in during a period when moist weather is prevalent, which would serve to encourage the development of the hopper (*Idiocerus spp.*)

2. *Tillering and Spreading Habit.*—Varieties that tiller freely and cover up the field, do not suffer so much from borers as those that present a thin condition. In the case of certain pests like the Paddy Grasshopper (*Hieroglyphus* sp.), on the other hand, the effect is quite otherwise, as the insect invariably prefers patches of thick growth. In certain places where the pest is bad, the ryots not only give up fertilising their fields, but even go to the extent of topping their paddy crop to get temporary relief from the pest. In one locality it was reported that G. E. B. 24, which presents a thin condition in unmanured plots, escapes serious damage from the grasshopper pest.

3. *Softness of the Stem.*—Soft and thick canes are worse attacked by borer (*Argyria sticticraspis*) than hard varieties, not only as regards tunnels in internodes, but in the matter of the causation of deadhearts in the early stages of the crop. Similarly there is a good deal of varietal difference in paddy in its susceptibility to stem-borer attack.

4. *Character of the Leaf.*—The character of the leaves is also often of much importance. Cane Aleurodids are said to prefer varieties with broad thin leaves.

5 *The General Vigour of the Plant.*—In the case of damage to tillers, the power of response evinced by the production of fresh shoots that can readily take the place of the damaged ones is a desirable quality in a variety. Again, in the case of certain pests such as thrips, it looks as if the possession of a certain amount of vigour on the part of the plant enables it to resist their onslaughts.

While these are some of the general characters that are likely to affect the degree of damage by insect pests, the conditions under which, and the manner in which, their study is likely to be rewarded, may next be considered.

It is common knowledge that certain insects have very specialised tastes, their food being restricted only to certain particular plants. As an example, one may cite the case of the Paddy Stem-borer (*Schœnobius incertellus*), which breeds only in paddy—wild or cultivated. There are on the other hand, other insects which are cosmopolitan in their tastes, having numerous host plants—wild as well as cultivated. In the former case, it is no good attempting to evolve a variety low in the scale of susceptibility, as such a variety, though showing comparative immunity in varietal experimental plots, may perhaps show itself to be subject to heavy attack when

grown by itself, since the pest has no other host plant to turn its attention to. The latter case, too, presents a similar limitation with the reservation that the selection made should be such as would continue to show a low degree in the scale of infestation, when compared either with the existing alternative crops or wild hosts. Under these conditions the inherent characters of a plant may have to be examined subject to the limitations indicated. The time of flowering and the duration of a crop, on the other hand, are factors of a different character, since they seem to permit a certain amount of judicious handling so as to steer clear of periods of maximum damage. The factor of natural vigour in a plant, investing it with a capacity to withstand damage, would appear to hold out promise of a great future in regard to combating certain pests, and the characters that are associated with vigour, therefore, deserve critical study.

G. E. B. 24 IN PALGHAT

BY P. A. VENKATESWARAN, B.A., B.SC. (AG.)

Agricultural Demonstrator, Palghat

'The which if you with patient ears attend,
What here shall miss, our toil shall strive to mend.'

General.—'What have Government to do with the actual processes of Agriculture?'—'How could these Government officers expect to help us?'—are questions still put by ryots to Agricultural officers. As often the questions have been asked, so often the answers have been given. Instances of the methods by which Agricultural officers have been hitherto able to assist ryots in different localities, have already been quoted and can still be multiplied. The object of this paper is to furnish one particular instance of how the department has helped the ryots with the strain of Paddy known as G. E. B. 24 in Palghat Taluk.

In Palghat Taluk, whose total area is about 4½ lakhs of acres, paddy claims about 2 lakhs of acres. From this it is seen of what great importance paddy is to Palghat, which has been aptly described as the 'Granary of Malabar.' Of the two lakhs of acres under paddy, about 120,000 acres will be single crop and the rest double crop area. The main paddy varieties used in the first crop season are *Chemban* (4½ months), *Chornali* (5 months), *Tavalakannan* (5½ months) and *Arikiri* (6½ months). The important second crop varieties are *Chetteni* (5 months) and *Anakomban* (6 months). It is important to note that *Chetteni* alone occupies more than half the second crop area in Palghat, i.e., over 40,000 acres.

Excepting in some places favoured with *Aeries* or tanks, the second crop paddy cultivation in this Taluk seems to be a gamble with the North-East Monsoon. Anakomban, the 6-months variety, is cultivated under *Aeries* or tanks in preference to short-duration varieties because of the assured water-supply; but, *Chetteni* is grown in lands entirely at the mercy of the North-East Monsoon. It has been the common experience of the ryots that the North-East Monsoon, more often than not, fails to give enough rain to mature even a short-duration crop like *Chetteni*. The vagaries of this monsoon mean disaster to the second crop.

Cultivation aspect.—G. E. B. 24 is well adapted to the conditions obtaining in Palghat. The introduction of G. E. B. 24 and its spread in

Palghat is mainly due to the scarcity of water for *Chetteni*. G. E. B. 24 assures the ryot of a second crop where it used to fail. As a substitute for the precarious *Chetteni*, G. E. B. 24 does well. It is generally cultivated as a second crop in double crop lands, where it comes to harvest a month earlier than *Chetteni*.

Transplanted in June–July, it is harvested in the latter half of November. Transplanted in August–September, as a second crop, it is harvested in the latter half of December. Practically before the beginning of January the crop is off the field, however early or late it may be planted. The flowering of this crop takes place between the 15th of October and the 15th of November.

In addition to the most popular name *Kichili Samba* many local names, like *Sirkar Samba*, *Company Samba*, *Madurai Samba* and *Neyyi Samba*, have been given to G. E. B. 24. But,

'What's in a name? That which we call a rose
By any other name would smell as sweet.'

Since 1926, the year in which G. E. B. 24 was introduced for the first time in Palghat, the area under this strain has been rapidly increasing year after year, as the following statement would show:

Year	1926-27	1927-28	1928-29	1929-30	1930-31
Acreage	5	90	500	2,000	15,000

This year (1930–31) on account of the extensive area grown under this strain and the concentration of my activities to definite centres of work, it has not been possible for me to attempt a countrywide enquiry. However, I have every reason to believe from my actual observation and study that the total extent of G. E. B. 24 would be about 15,000 acres in 1930–31.

It is found that even Cherumas, the hardiest and ablest tillers of the soil, though the lowest and poorest class in the land, have taken to the cultivation of this strain earnestly. The following incident, which occurred in August 1930, serves to show convincingly how a Cheruma has come to appreciate the high value of G. E. B. 24.

When I was plodding my weary way from Olavakode Railway station to the Nayadi colony, I happened to notice a Cheruma, who was following me with a basket at a short distance behind, exhibiting its contents to some passers-by. Curious to know what the exhibit was, I stopped short and called for the man. I was told by this Cheruma cultivator, who belonged to the neighbouring village Agathethara, that he had in his basket two Paras of '—— Samba' purchased for Rs. 2-12-0—at the rate of Re. 1-6-0 per Para (6⅔ M.M.)—indeed a high price for any paddy seed. I was surprised to find on examination that his '—— Samba' was a poor sample of our G. E. B. 24. Remaining *incognito*, I put him questions, which brought out the information that, as he had seen the performance of this Samba, he decided to try this paddy, for which he did not grudge paying such a high price. Complimenting him, in the name of the Department, for his warm advocacy of this excellent strain of paddy to his brother tenants, I led the way to him.

Economic aspect.—As *Chetteni* is the principal crop which G. E. B. 24 in Palghat, under the existing conditions, replaces—although, in point of duration, *Chetteni* is not on a footing of equality with G. E. B. 24—the comparative study of G. E. B. 24 can be made with reference to *Chetteni*. For purposes of presenting the economic aspect of the cultivation of G. E. B. 24 in as simple a manner as possible, a rough and ready method of calculation is adopted here with fair success.

The average yield per acre of *Chetteni* in Palghat might be put down at 60 to 70 Paras of paddy worth Rs. 39 to Rs. 45 at the average normal price of Rs. 45 per cart-load of 70 Paras. The average yield per acre of G. E. B. 24 can be put as 70 to 80 Paras worth Rs. 60 to 69 at the average normal price of Rs. 60 per cart-load of 70 Paras. Thus, there is an increased profit of Rs. 21 to 24 per acre by growing G. E. B. 24 in place of *Chetteni*.

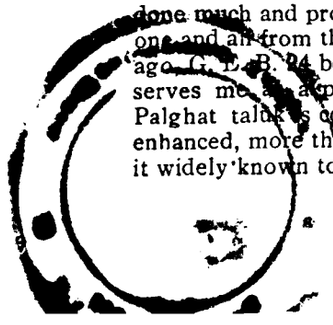
This year (1930–31) on account of the 'excesses' of the North-East Monsoon, G. E. B. 24 in common with *Chetteni* has not come up to expectations in some places. The prices have also fallen down in the case of *Chetteni* from Rs. 45 to Rs. 35 and in the case of G. E. B. 24 from Rs 60 to Rs. 50 per cart-load. While *Chetteni* gave on an average 40 to 50 Paras per acre worth Rs. 20 to Rs. 25, G. E. B. 24 gave on an average 50 to 60 Paras per acre worth Rs. 36 to Rs. 43. There is still a margin of Rs. 16 to Rs. 18 per acre in favour of G. E. B. 24.

On the whole, therefore, G. E. B. 24 can be expected to give an average increased profit of anything from Rs. 16 to Rs. 24 per acre.

But, mention has, however, to be made here of the fact that the straw yields of both *Chetteni* and G. E. B. 24 have not been taken into consideration. It is admitted that G. E. B. 24 yields less straw than *Chetteni*. Taking all these circumstances into consideration—to be on the safe side—I would put a smaller sum, say Rs. 10, as the average increased p ofit accruing from the cultivation of an acre of G. E. B. 24; because in Shakespeare's words,

> 'The ample proposition that hope makes
> 'In all designs begun on earth below
> 'Fails in the promis'd largeness: checks and disasters
> 'Grow in the veins of actions highest rear'd,
> 'As knots, by the conflux of meeting sap,
> 'Infect the sound pine and diverts his grain
> 'Tortive and errant from his course of growth.'

Conclusion.—The conclusion is that 15,000 acres of G. E. B. 24, yielding an extra profit of Rs. 10 per acre, put Rs. 1,50,000—a no small amount—into the pockets of the ryots. But, the potential area where this strain can replace *Chetteni* is, as previously stated, over 40,000 acres and the potential extra gain in the event of the whole of this area being cropped with G. E. B. 24 will be the huge total of four lakhs of rupees. G. E. B. 24 has done much and promises to do more. G. E. B. 24 has given satisfaction to one and all from the high caste Brahmin to the low caste Cheruma. Long ago G. E. B. 24 became the trump card in my propaganda; now, G. E. B. 24 serves me as a passport for entering even *Purdah* farmsteads. As far as Palghat taluk is concerned, I can unhesitatingly say that G. E. B. 24 has enhanced, more than anything else, the prestige of the Department and made it widely known to the cultivators.



SINDEWAHE DOUBLE FURNACE

By M. A. BALAKRISHNAN, L.AG.

Agricultural Demonstrator, Gudiyatam

The sugar-cane cultivators of our Presidency mostly adopt the practice of converting the juice into jaggery by means of boiling. Various types of furnaces are in use for this purpose. The ordinary country furnace is one of them. It is a big circular pit with slightly curved sides. In this, facilities for feeding the fuel and for the inlet and exit of air are so poorly provided that much heat is wasted. For manufacturing jaggery from an acre of cane, the ryot has to spend about Rs. 50 worth of fuel, in addition to using the whole of his megass and trash. This is a costly and tedious process, and takes about three weeks to finish the work.

The introduction of the Sindewahe furnace by the Agricultural Department found favour with the ryots and this is the type now in common use by a large number of the sugar-cane cultivators. Its construction and use have been dealt with in detail in the Villagers' Calendar for the year 1923–24. Apart from the savings in the item of fuel, the time required for making jaggery is comparatively less. It takes about 12 days per acre and hence the popularity of this type of furnace.

A slight addition to the present Sindewahe furnace would still minimise the number of days to 7 or 8 for making jaggery from an acre of cane. The process of constructing a second furnace is quite simple. The additional or upper furnace is constructed 1 ft. 10 in. away from and 6 inches above the lower one. From the lower furnace and 3 inches from its bottom a flue (hot air passage) 6 inches high rises and opens into the upper furnace. In front of the opening of this upper furnace and 1 ft. 9 in. away from it 5 bricks are placed equidistant from one another in vertical positions like a honeycomb and these bricks are supported behind with half bricks as props and mud plastered to keep them in position. This serves as a baffle to arrest the rush of hot air issuing from the lower furnace.

To start with, both the pans are provided with juice. The exhaust hot gas from the boiling or lower furnace passes through the flue into the upper furnace. There it spreads out and imparts its heat to the storage pan and finally passes out through the chimney. When the first charge in the boiling pan is over the hot juice in the storage pan is made to empty itself to the boiling pan by means of the syphon and the storage pan gets replenished with fresh juice.

The height of the chimney is 10 feet and its diameter 10 inches. A small pit 6 inches deep is provided at the bottom of the chimney to collect any charcoal residue that might be blown out through the hot-air passage. Either brick-in-mud or iron-plate chimney is in common use for the Sindewahe furnace. The former is not easily transportable and is washed off during rains, while the latter gets perforated and rusted after a few years' use. Instead of these, 5 earthenware pipes each 2 feet long by 10 inches diameter have been placed one over the other to serve the purpose of a chimney.

Trials conducted at the Agricultural Research station, Palur and in the lands of the ryots at Gudiyattam taluk of the North Arcot district had

shown that in the case of a single Sindewahe furnace it took on an average about 34 minutes to boil down 100 lbs. of juice and about 23 minutes for the same quantity in a double Sindewahe furnace. In other words, a charge which usually took about 1½ to 1¾ hours had been finished within an hour or 1¼ hours with this type of furnace.

(1) It is thus seen that there is a saving in time of over 30 per cent by getting the juice heated previous to boiling.

(2) There is practically no investment for this type of furnace construction, because the additional purchase of a second pan, provides for an interchangeability of the two pans in both the furnaces and thus ensures the durability of the pans in the long run.

(3) As regards earthenware pipes as chimney, it has the following advantages :

(*a*) It is very cheap. It costs only Rs. 0-15-0 for all the five pipes as against Rs. 8 for the iron chimney and about Rs. 2-8-0 for the brick-in-mud one.

(*b*) Neither does it rust like the iron chimney nor does it become difficult of transportation ; nor is it washed off during rains like the brick-in-mud one.

(*c*) It can last a very long time provided it is securely kept and carefully handled.

(*d*) Any village potter would easily make such pipes.

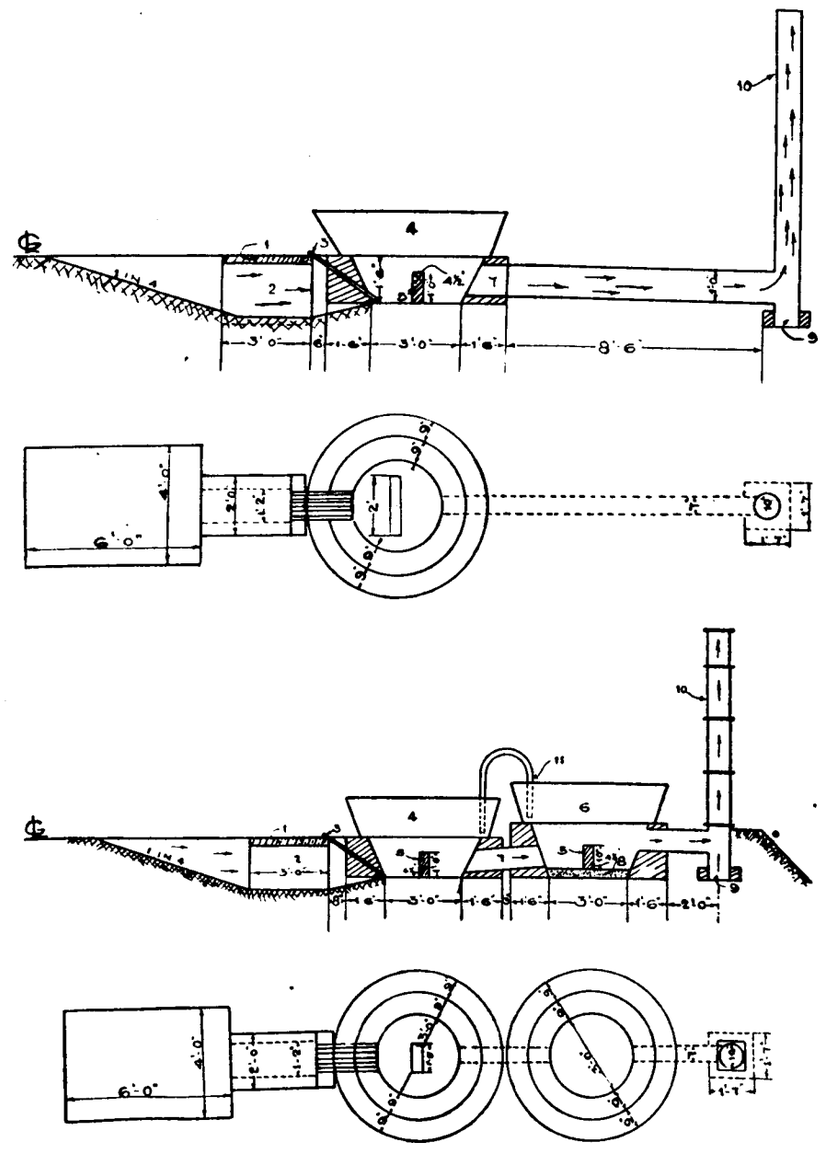
(4) Needless it is to add that a ryot who has to attend to various other agricultural operations like planting fresh areas of canes, irrigating newly-planted and standing crops etc., will find his pressure of work considerably reduced.

This type of double furnace is specially recommended for landlords who have to deal with canes over large areas. Besides, two or three small ryots can co-operate together and, at a trifling cost, add another furnace and save much time and worry.

For details please see in the plans attached and to the photo showing the working.

[*For the benefit of our readers who may not have access to the Villagers' Calendar 1923–24, we reproduce below the details of construction and advantages in the use of the Sindewahe furnace referred to in the article. Ed. M.A.J.*]

Construction—Select a level piece of ground conveniently situated near the cane fields. The size of the furnace depends on the size of the boiling pan in use in the tract. For a pan of 7 feet in diameter, dig a circular pit 6½ feet in diameter, 1½ feet in depth with sloping sides so that the space at bottom of the pit is 4¼ feet in diameter. In this pit construct a wall of mud or of brick-in-mud, one foot high and 4 inches broad, leaving a space of half a foot on either side to serve as a passage for smoke and hot gases to escape through. This wall also serves to prevent the flame from being drawn by the draught of air into the outlet and thus to spread it out within the furnace. The top of this partition wall when constructed will be 6 inches below the bottom of the boiling pan. The outlet for smoke and hot gases is to be constructed on the side of the mud wall opposite to the feeding hole and in a line with it. The position for fixing the iron grating into the feeding hole will be mentioned later on. The size of the smoke outlet should be 15 inches deep and 7 inches wide. This opening should be continued to a distance of some 8 to 10 feet where a chimney ¾ to 1 foot in diameter and about 8 feet high should be constructed and should be smoke-tight and continue with the air outlet. The outlet and the opening should face the direction from which the wind



SINDEWAHE FURNACE

Above—Single furnace. Below—Double furnace. 1. Stone slab. 2. Air passage. 3. Grate. 4. Boiling pan. 5. Baffle wall. 6. Storage pan. 7. Flue. 8. Earth filling. 9. Residue pit. 10. Earthenware pipe chimney. 11. Siphon.

generally blows. The chimney may either be of sheet iron, brick-in-mud, earthenware or mud. Sheet iron chimneys are convenient in case the furnaces are not permanent and are only constructed for one season. The cost of such a chimney is estimated at Rs. 16.

The iron grating over which the fuel is fed and through which the draught of air necessary for the complete combustion of fuel is supplied, is made of ½ inch round iron bars each 20 inches in length fixed up ½ inch apart to two pieces of 1 inch broad flat iron. The size of the grating, when made, should be 14 inches broad and 20 inches long. The cost of this grating at present prices, is estimated at about Rs. 6. This grating should be fixed in a slanting position, its bottom touching the lower rim of the furnace and the upper edge fixed at a point 8 inches away from the top rim of the furnace and 3 inches below the ground level. This leaves an opening 14 inches wide, and 7 inches between the pan and the top of the grating.

Advantages.—The advantages which this furnace possesses over other furnaces are :—

(1) A considerable saving is effected in the matter of fuel. All the boiling can be done on the megass (the refuse of sugarcane after the extraction of juice) alone. In Coimbatore district, the ryots have to spend as much as Rs. 50 per year in having to purchase fuel to supplement the megass for each acre of cane dealt with and this will be a clear saving to the ryot.

At the end of the crushing season if the Sindewahe furnace is adopted there would be even a balance of the megass left over. This and the whole of the trash should therefore be available for use as manure. It is reckoned that the trash left over in an acre of cane-field is equivalent to 30 cart-loads of cattle manure in its manurial value and the ryot can therefore use all the trash to supply the bulky organic manure, supplementing the same, if necessary, by other concentrated manures like oil-cakes, etc.

(2) The construction of the furnace is quite simple ; the iron grating can be made by the village blacksmith, at a cost of about Rs. 6.

(3) The feeding of the furnace is not at all laborious and can be attended to by a boy. The megass does not require to be bundled up ; the feeding has only to be done by handfuls at a time. The person attending to the feeding does not feel the heat so much as in the case of other furnaces and does the feeding quite at ease.

(4) The burning of the fuel being steady, the combustion being complete and the distribution of the heat being more uniform, a larger number of boilings can be done in a day, at least 25 per cent more.

(5) As a result of even boiling, the collection of the scum is easy and the juice attains the proper consistency by degrees. A better control over the boiling juice is possible and thus over the colour of the jaggery. Burning and charring of jaggery is impossible with this furnace.

(6) Lifting of the pan is easier with this furnace as the heat of the furnace is always controllable.

THE ANNUAL COLLEGE DAY AND CONFERENCE

The Annual College Day and Conference held under the auspices of the M.A.S. Union will be held this year in December instead of July. The exact dates will be fixed in consultation with the Director of Agriculture and announced in due course.

The elections of Office-bearers will take place at the General Body Meeting to be held in December, and Nominations will, therefore, be accepted up to the 1st of December 1931.

K. M. THOMAS,
Secretary.

CHAYAPASUPU OR HILL TURMERIC

By P. L. NARASIMHAM

Assistant Agricultural Demonstrator, Narasapatam.

Turmeric is cultivated in the Golugonda hills by the Bagatas and Valmikies, the principal tribes of the tract, who raise it in small patches of land varying from 10 to 30 cents. The crop is grown dry with the help of rainfall which ranges from to 60 to 80 inches per annum. It is grown pure or as a mixture with *Pippali* (long pepper).

Soil.—The soil on which this crop is grown is loamy and is naturally very rich in its content of organic matter, being therefore capable of giving heavy returns, even without manuring.

Preparatory cultivation.—With the help of the summer rains the ploughing of the land is commenced, and is completed by the beginning of June. The total number of ploughings given may vary from 3 to 5 as in the case of any other crop in the tract.

Manuring.—Normally, a system of regular fallowing is adopted between every two crops, so that there is no need for manuring; but in areas where such fallowing is not possible, cattle manure is applied sparingly, the maximum being about 3 to 5 cart-loads per acre. No penning of sheep or folding of cattle is done.

Seed material.—For planting, side shoots from the main fingers of the previous crop are selected at the time of cleaning and preserved in pits. These pits are dug under the shade of the eaves of the dwelling houses. The seed material is placed in them, covered over with straw and finally plastered over with dung. The pits are opened only at the time of planting. The quantity of seed material used is about 1,500 to 1,800 lbs. per acre.

Planting.—This is done after the break of the South-West monsoon. On somewhat sloping land, the seed material is dibbled in furrows one foot apart made by a country plough at a distance of about 9 inches, (the ryot expressing the spacing between the lines as the distance between the two horns of a bullock), and covered over by foot. On more level land, the furrows are somewhat closer apart (6 to 8 inches) so that the seed dibbled in the previous furrow is covered by the earth from the next furrow. When sown as a mixture with long pepper, a finger of turmeric is planted in the midst of every four vines of long pepper. The turmeric is said not to affect the yield of the long pepper.

After-cultivation.—This consists chiefly in hoeing three times during the life of the crop, the operation being done fairly deep. The first hoeing is given about a month after planting; the second in the third month and the third which is known as *Panta Goppu* is given in the month of December.

Harvesting.—The crop is ready for harvest early in January, when the digging of rhizomes is commenced, and carried on till the end of February or beginning of March. The dry leaves are first removed, and the rhizomes are dug out with crowbars. As the rhizomes are lifted, they are immediately cleaned free from soil and the side roots cut off. While doing

this the rhizomes are graded into two sorts namely *Pedda Pasupu* and *Musili Pasupu*, and sometimes into three sorts, *Peddapasupu*, *Dumpapasupu* and *Musilipasupu*, the first two going as *Peddapasupu* in the former case. *Dumpapasupu*, is the round central rhizome, while the fingers form the *Peddapasupu*. *Musilipasupu* is the original partly spent-up seed material, on which, some money is realised.

The crop is not generally harvested at one time. Such quantity as can be cleaned and marketed by an individual family is dug out at a time, and when this is cured, more stuff is dug up.

Curing and preparing for the market.—This is very simple, and consists of placing the raw fingers (cleaned) in a pot filling it with water and covering the mouth with a smaller pot, or a thick layer of leaves. It may be noted here that no cow-dung is added to the water or over the rhizomes as in the Godavari District. For each boiling about 50 lbs. of raw rhizomes are put in the pot. The process of boiling takes about 1½ to 2 hours during which the water froths up three times. After the third frothing, the stuff is removed from the vessel, and dried in the sun on a clean floor for about ten or twelve days, and when dry, it is rubbed on flat stones to give a polish. If the weather is fair, the harvest, curing, drying and polishing take about a fortnight. The stuff thus prepared goes to the market in the name of *Chayapasupu* and is now selling at Rs. 60 to Rs. 64 per candy (of 500 lbs.) at the Kondasantha shandy. *Dumpapasupu* when separately graded is cured in the same way and fetches about the same price as that of *Peddapasupu* if not more, as it yields a larger quantity by measure of turmeric powder than the fingers, for the same weight pounded. *Musilipasupu* which is selected out at the time of cleaning is dried in the sun, without boiling, for about a week or ten days. It does not stand boiling, as it crumbles to pieces if so treated. The hillmen prefer this *Musilipasupu* for their *masala* (curry) powder, as it is reported to give better taste than the other. After being dried *Musilipasupu* also sometimes goes to the market in the name of *Avva Pasupu* or *Kura Pasupu* and fetches a low price of about Rs. 24 per candy according to the recent shandy rate. Usually it fetches about one-third the price of ordinary *Peddapasupu*, the merchants often purchasing this for adulteration with *Peddapasupu*.

Yield.—The yields are heavy compared to those of the plains where more care is bestowed. The yield is about 25,000 lbs. of greenstuff per acre or 5,000 lbs. of prepared produce fetching Rs. 600 to Rs. 640 per acre according to the present market rate.

Kondasantha, a place situated at the foot of the hills, nine miles from Narasapatam is the chief market for hill produce. A weekly shandy is held there on Fridays. From this shandy, merchants from Narasapatam purchase the stuff and take it to Tuni and other markets. A large quantity of hill turmeric is also received from Gangaraju Madugula Mutha of the Padwa taluk where the crop is said to be more extensively cultivated.

It may be noted here that the variety of turmeric cultivated in the hills and which yields *Chayapasupu* and that giving the *Kurapasupu* of the plains are said to be the same, the difference in the quality[1] being attributed to the richness of the soils in the hills. A ryot who actually brought the seed

[1] *Chayapasupu* is harder, closer-grained, and of a deeper yellow than *Kurapasupu*.

material from the hills and grew the crop from it for some years in the plains, stated that in spite of the best care taken regarding manuring etc., the stuff that was produced was inferior to that produced in the hills. If, even after a closer examination by a Botanist, the varieties are found the same, it will then be a matter for a Chemist to find an explanation for such a vast difference in the quality. If it is due only to environmental conditions, it should not be impossible for the plains ryot to satisfy the hill conditions, by artificial means and get a much higher income than he now gets out of the crop. The problem, therefore, is not merely academic but of considerable economic value.

MAN'S INSECT-ALLIES AGAINST A VEGETABLE FOE*

WAR ON THE PRICKLY-PEAR PLAGUE IN AUSTRALIA.

Australia has been termed *A Land of Pests*, mostly imported from other countries. Not the least of these is the prickly-pear, a plant of American origin belonging to the cactus family (*Cactaceæ*), a species which has spread over 50,000,000 acres of land in Queensland and New South Wales, and is known throughout Australia as the Pest Pear, or more simply, 'The Pear' (*Opuntia Inermis*). A century and a half ago, when Australia was first colonised, the cochineal industry was a monopoly of Spain and Portugal; cochineal, of course, being a red dye obtained from an insect which lives exclusively on certain kinds of prickly-pear. When the first fleet landed at Sydney in 1788, there were landed also specimens of the insect and pear privily obtained by the commander in Brazil on the voyage out, it being hoped to establish the cochineal industry at the Botany Bay; but the plant and the insects died, and for the time being Australia remained free from the pest.

Fifty years later, a Dr. Carlisle, migrating in a sailing ship to Australia from England, took with him, and carefully tended on the long voyage out, a rare plant in a pot. He settled at Scone, some 200 miles north of Sydney, and the doctor's gardener, enamoured of the strange plant, carried it about and established it here and there, expecting it to be a good reserve food for stock in a dry year. Other plants found their way into Queensland further north. They spread rapidly far and wide; the climatic and soil conditions suited the pear; soon it established itself everywhere, and about 1870 it was found that the pest had got beyond control. From then on, the pear rapidly spread throughout the sparsely-inhabited hinterland of Queensland; it advanced in every direction; it grew with amazing rapidity; it was extraordinarily prolific; there was no stopping it; farmers and graziers were in despair. Forty years later—in 1910—it was estimated that the pear had overrun 20,000,000 acres, and was advancing at the rate of 1,000,000 acres yearly. Over 30,000 square miles of territory had been invaded. By 1916 nearly 23,000,000 acres had succumbed to the pear, or 6,000,000 acres more than the total area under crops in the whole of Australia.

What is this terrible pear? It is a typical giant cactus armed with needle-shaped and powerful spines and bristles. These spines can penetrate a stout boot-sole; the bristles are barbed, and, once they enter the skin or clothing, are not easily removed, and will cause serious irritation both to

* Adapted by Dr. T. V. Ramakrishna Ayyar from an illustrated article in the *Illustrated London News*.

man and beast, and even illness. The flower is a large yellow blossom, and the plum-sized fruit is pear-shaped, hence the name. The plant is drought-resistant, and makes a dense growth of considerable height, constituting an impenetrable jungle of vegetation.

Once the authorities had become aware of the enormous spread of the plant and its devastating properties, steps were taken to deal with it. A Government Prickly-Pear Travelling Commission was set up, which travelled round the world in 1912–14 studying the plant. An immense amount of information was obtained, particularly from the skilled botanists of the United States. Two solutions of the problem presented themselves. The pear could either be economically utilized, or it must be eradicated. Experiments were made to ascertain whether it had any marketable or useful qualities, but research failed to establish any means by which the immense area of plant growth could be economically exploited. Nothing remained but to attempt to eradicate the pest.

Elaborate machines were constructed for cutting, breaking down, rolling, and destroying the pear. Powerful tractors were brought up and attempts made to drive them through the jungle of growth. Teams of bullocks were harnessed to heavy logs by chains in such a way that the log worked at the side. But all these methods proved inadequate to the tremendous task of destroying the pear over 50,000,000 acres. Mechanical means and human and animal labour having been abandoned, chemical poisoning was next attempted. Injection and spraying of arsenic compounds, proved effective, but the method was found very costly (from £2 10*s*. to £4 per acre, and other disadvantages accompanied the unrestricted use of arsenic. The discharge of poisonous vapours was tried, but was found wasteful and inefficient, and only satisfactory with a very light breeze in the desired direction. Finally, it was decided that eradication by mechanical or chemical means would never completely solve this national problem facing the whole continent.

At this juncture, the whole resources of the Commonwealth were mobilized. The Governments of Queensland and New South Wales were assisted by the Commonwealth Government; all the best scientific brains were enlisted; funds were provided for a new campaign; and a new method was decided upon—biological control. The Travelling Commission had found that in India and Ceylon the tree pear had, in many localities, been almost exterminated by a cochineal insect. Accordingly, segments of the tree pear with colonies of these insects were sent to Queesnland from Ceylon, and also from South Africa. Tests were made, but alas! the insects could not even be induced to feed on any kind of prickly-pear except the tree pear, and the pest pear had triumphed once again. What was to be done?

Enemies of plants fall into two classes—those which live on a great variety and are termed 'omnivorous vegetarians', and those which live only on a single type of plant and are termed 'restricted vegetarians'. Obviously, a restricted vegetarian had to be found. But there were difficulties, and not the least was the fear of introducing some new pest worse than the pear pest itself.

Consequently, in seeking a 'restricted vegetarian' which would prey upon the pest pear and on nothing else, the greatest caution was required. 'Biological control' promised the only hope of success, but the insect itself

must be completely under control; must do its work and then die! An experimental station was set up, and insects and parasites of all kinds were imported from North and South America. From exhaustive tests there emerged a faint ray of hope in the shape of *Cactoblastis cactorum* Soon, this stout-hearted little fellow began to be regarded as Australia's 'White Hope' in the fight with the pear. He is extraordinarily prolific; he is a most accommodating insect; yet he is very particular in his diet, and shows a marked partiality for the pear—so marked, indeed, that he will eat nothing else. He was soon acclimatised and has been easily established.

Then, however, arose the necessity for investigating the adaptation of *Cactoblastis* to Australian conditions, and of his immunity from natural enemies. Climatic changes affect the welfare of moth caterpillars in general. Excessive rains, for example, bring diseases; but *Cactoblastis* has shown great hardihood in these circumstances, whereas extreme dry heat is a severe trial to him. Again, certain Australian parasites and predatory creatures have turned their attention from native hosts to the new arrival. These enemies and their effect are being carefully watched. Where a vast number of caterpillars of *Cactoblastis* have been congregated in a limited area, however, they have been practically immune from bird attack.

The Commonwealth Prickly Pear Board and the Council of Scientific and Industrial Research, now believe that the end of the pear is in sight. Nearly £100,000 a year is spent on behalf of *Cactoblastis* in his battle with the pear, and he is winning all along the line. The war is being watched with intense interest throughout Australia and by entomologists throughout the world. At frequent intervals bulletins and communiques are issued by the Board detailing results of the latest attack on some particular salient, and noting the health and fighting disposition of the troops. Immense reserves are in hand, and the front line armies are constantly being reinforced. Only five years have elapsed since the first 2,500 eggs were brought to Australia from Uruguay. The consignment proved an immediate success; the caterpillars thrived on the pear and produced moths that deposited 100,000 eggs. The second generation yielded 2,540,000 eggs. From October 1927, to June 1929, in Queensland alone, in the main pear area, 220,000,000 eggs were liberated and distributed, and in 1930 the Board liberated 500,000,000 eggs.

The havoc which *Cactoblastis* is wreaking on the pear, is marvellous to behold. Soon after the attack begins, the plant becomes yellow and sickens. A few months later the entire plant has rotted away, only skin and fibre being left. Any new shoots which may spring up are, in their turn, attacked, and soon perish. The female lays eggs in sticks about 1½ inches long, holding an average of 75 eggs, which hatch twice a year, taking from 3 to 6 weeks to develop. The caterpillars pass their existence within the pear segments; they obtain a length of about 1 inch, and live in colonies of 20 to 100. When full-grown, they spin loose white silky cocoons, which have a duration of about 5 weeks. The moths live only for a few days. The caterpillars eat out the interior of the pear joints, tunnelling from joint to joint. In the younger segments, the whole inside is eaten, leaving only the thin papery cuticle; older pads are not entirely destroyed, but wet rots, caused by various fungi and bacteria, finding suitable conditions for development, hasten and complete the destruction. The caterpillars may even penetrate into the underground bulbs and roots, and with the aid of the associated rots, the clumps are entirely killed.

Great numbers of eggs may be laid in a limited area, even 1,000,000 an acre. With this vast quantity of caterpillars feeding, and enabling rot conditions to develop, the spectacle is afforded of the pear collapsing and dying as though visited by some virulent plague. The host of *Cactoblastis* now in Australia numbers many thousands of millions, and this vast horde has sprung from the original 2,500 eggs introduced in May 1925. The terrific work of destruction proceeds silently, continuously, incessantly. It is suggested now that besides devouring the pear, *Cactoblastis* probably communicates to it some disease, and hence re-growth of a plant, once eaten, is prevented. So, scientific research has found the insect which can do what MAN unaided has failed to do; has found an insect which prefers death to eating anything but the pear, an insect which, when the pear is exterminated, will himself die out, leaving, it is hoped, no trace of his prey or of himself.

Insects are often regarded as the most dangerous enemies of man, but on occasion, they can prove valuable allies. Later news on the same subject appeared in a recent message from Sydney, by the British United Press, which states :—

'Within three years a million acres of land which had been laid waste by prickly-pear, a cactus plant, have been saved. The plant in the last thirty years has overwhelmed an area of fertile lands in Southern Queensland and Northern New South Wales equal to half the size of England. Scientists were sent round the world to discover a parasite which would kill the plant. But all efforts were unsuccessful until the arrival of the *Cactoblastis* moth. This moth is a prolific layer of eggs, from which emerge grubs that eat into the heart of the plant and kill it. Millions of these moths are now being bred. The summer brood of eggs is ready in February and March, and thousands of consignments will be sent to the stricken districts.'

Notes and Comments

The late Mr. K. T. Paul.—The sad demise of Mr. K. T. Paul at a comparatively young age, removes from India an outstanding figure not only in socio-religious and political circles but also in the field of Co-operation and Agriculture. Mr. Paul's activities in the development of Rural reconstruction in India and his pleadings on behalf of the Indian ryot are too well-known to need recapitulation here. We offer our most sincere condolences to Mrs. Paul and other members of the bereaved family. The family has indeed lost much, but the country has lost more.

Dr. L. C. Coleman, C.I.E.—We offer our hearty congratulations to Dr. L. C. Coleman, M.A., PH.D., Director of Agriculture in Mysore, on the Companionship of the Indian Empire recently conferred on him.

The Maynard-Gangaram Prize.—We offer our felicitations to Dr. C. A. Barber, C.I.E. on the award to him of the Maynard-Gangaram prize for his work on sugar-cane. The prize of the value of Rs. 3,000 is awarded every three years for a discovery or an invention or a new practical method which will tend to increase agricultural production in the Punjab on a paying basis. Dr. Barber's Coimbatore seedlings have been definitely proved to be much higher yielders under the Punjab conditions.

Indian Science Congress.—Mr. G. N. Rangasami Ayyangar has been chosen as the President of the Agricultural section of the Indian Science Congress to be held at Bangalore in January 1932. We congratulate him on the honour done to him and to the Madras Department of Agriculture.

Recruitment to the Science section of the Madras Agricultural Service.—The G. O. No. 314, Public (Services), dated the 7th of April 1931, embodies certain amendments to the rules previously published regulating the method of recruitment, conditions of service, pay etc. of the Madras Agricultural Service. While, according to this Government Order, all diplomates and B.Scs. in Agriculture are eligible for admission to the Gazetted rank in the Agricultural section, it debars the diplomates from corresponding promotions in the science sections, and the case of B.Scs. in Agriculture is doubtful. In laying down the qualifications for recruitment to the science sections of the Madras Agricultural Service, the Government Order says thus, 'the degree of the B.A. (Hons.) in a science subject or M.Sc. or an equivalent or higher degree of any of the Universities mentioned in the annexure to these rules, provided that a member of the Madras Agricultural Subordinate Service in the Research section possessing the degree of B.A. in a science subject or B.Sc. of the University of Madras or an equivalent or higher degree of any of the Universities mentioned in the said annexure shall be eligible for selection to the service in the science section'. It is not clear whether the B.Sc. of the University of Madras includes the B.Sc. in Agriculture of the University. If it does not, it is detrimental to the interests of the Agricultural graduates already in service and that of the future entrants. While we agree that high qualifications should be insisted upon for direct recruits to the service, in the case of men already in service the scientific experience and record of work should receive greater consideration in deciding promotions to the higher scientific services. We would invite the attention of the authorities concerned to this aspect of the case and would suggest that the rule might be so amended as to remove the disabilities which the present rules impose on diplomates and B.Scs. in Agriculture, who are now in service or who may enter it in future.

Mr. C. M. Hutchinson on Artificial Fertilizers.—Mr. C. M. Hutchinson, C.I.E. in a pamphlet on *Indigenous Fertilizers in India* expresses himself thus in the concluding portion; 'In the meantime we are faced with the problem of increasing the production of crops in India in order to cope with the industrial and economic needs of the country. Objections have been raised to the utilisation of imported fertilizers for this purpose based on an astonishing variety of reasons, political, sentimental, and quasi-scientific or economic, and this attitude of mind has even been supported and strengthened by certain ill-considered *ex cathedra* pronouncements made by Agricultural authorities. Every one with recent experience of agriculture in this country is aware of the fact that the use of artificial fertilizers at their present prices is an economic proposition for the Indian cultivator; *all that remains to be done is to discover by experiment the best way to make use of them and hand on this knowledge to the ryot.* (The italics are ours). The general conclusion with regard to the function of indigenous fertilizers in Indian agriculture therefore seems to be that, owing to their insufficient amount and relatively high cost, such materials as oil cakes and bones can only play a subsidiary part in the upkeep of soil fertility in India. Where they are available at reasonable prices they should be used, generally in conjunction with artificials which are necessary to bring up the nitrogen content of the soil to the level required for any considerable

increase in crop production. For the major part of the arable area, however, indigenous fertilizers are not available, and any doctrine declaring that these alone should be used in Indian Agricultural practice or *even that only in conjunction with them may artificials be applied, is a foolish and dangerous one highly prejudicial to the interests of the cultivator and to the welfare of India as an Agricultural Country.*' (The italics are ours). If Mr. Hutchinson is only a propagandist for artificial fertilizers, we would have left his statements alone. But when he says what he has said with about 20 years of research experience behind him as Imperial Agricultural Bacteriologist at Pusa, they cannot be allowed to go unnoticed.

In the course of his article he objects to any restrictions on the export of bones, oil seeds and oil cakes, although, as a member of the Board of Agriculture in the year about 1922, he supported the resolution on the total prohibition of exports of indigenous manures. We can understand his change of position now from his *recent experience of Agriculture in this country*; but his remarks about ill-considered pronouncements *ex cathedra* of Agricultural authorities on the use of artificial fertilizers, betray his ignorance of recent scientific work in India, England, Germany and America on the value of organic manures. His suggestion to discover by experiment the best way to make use of artificial fertilizers, is already in force and the information, so far obtained, goes to show that it is not desirable to use artificial fertilizers alone for industrial and food crops—more especially for food and fodder crops and that the artificials can best be used economically in small quantities *in conjunction with organic manures.* The experimental work to be done is how best to conserve and augment the indigenous manures to the best interests of the agriculture of this country, and not on the use of exigenous artificials on which considerable experimental work has already been done in India.

Import of Japanese Rice into India.—The Committee of Indian Merchants' Chamber, Bombay, recently addressed a letter to the Government of India regarding the grave menace to the rice-growers of India caused by the rice imports from Japan. India including Burma is essentially a big rice-producing country, having an exportable surplus. In such a country it would naturally be difficult for foreign rice to secure a foothold but it is alleged that the Japanese Government has been fostering the export of rice into India, regardless of cost. This import of foreign rice into the country at a rate below the ruling prices in the Indian markets, would seriously disturb the Indian trade in rice, much to the prejudice of the agricultural population. Japan, since 1928, had checked effectively imports of rice into the country except from her colonies by suitable legislation, her supplies being more than her requirements. This surplus is now being dumped into the Indian market at uneconomic prices chiefly to create a demand for the same. This policy of Japan, as is pointed out in the letter, becomes a menace inasmuch as the surplus is passed on to us without regard to our needs and when there is not, and cannot be, a demand for the same. It not only disturbs the economic level of prices but also vitiates the possibility of the Government making a correct calculation of economic price. The chief rice-exporting province of India, Burma, is already losing her markets gradually, mainly due to the increase in the production of rice in countries which formerly entirely depended upon Burma, and this menace from Japan should seriously affect her. It is but right to expect that the Government in India would take early steps to prohibit such imports, if necessary by suitable legislative measures.

The present day rice-bran and its use.—In a recent contribution under he above heading to the *Indian Veterinary Journal*, Mr. T. Krishnaswami Ayyangar discusses at length the evils of the present-day practice of feeding cattle with 'mill-bran.' The time-honored practice of preparing rice for consumption is first to husk the grain in the wooden pestle and mortar to remove the husk and then polish the rice to remove the bran adhering to it. The husk would be usually thrown away or used as fuel, and the soft bran which forms about 10 to 12 % of the whole paddy by volume, makes an excellent cattle food. In the big rice mills which prepare rice chiefly for export, there is first decortication of the grain and the husk is fed to the boilers, the soft bran resulting from the subsequent polishing processes, being available as cattle food. The installation of the small hullers in practically every village in South India, is turning out bran of a very inferior quality, it being nothing but powdered husk with a small quantity of real bran mixed with it. The shelling and polishing are accomplished in one and the same process and it is impossible to separate the husk from the bran even with a sieve. Husk has absolutely no food value, and sometimes when the paddy is not properly cleaned before milling, a fair amount of mud and small stones get powdered and incorporated with this so-called bran. This stuff, because of its cheap price, is being extensively used for feeding cattle with. It is stated that this husk produces in the early stages irritation in the intestines of the animal and causes diarrhœa, particularly in young animals. At a later stage it is said to impair the digestive power of the animal, producing impaction of the rumen. The author of the article has come across a large number of cases coming for treatment in the veterinary hospitals in North Arcot District, the main source of trouble being the feeding of these animals with this bran. It is well to draw the attention of the poor agriculturists to the grave risk they are running in feeding their animals with this cheap feed which undermines their health.

Gleanings

Fruit Juice—direct from the Tropics. According to a pamphlet on the subject, sent by Cosmic Ray Products. 107, Ebury St., London, S.W.1, the bacteria that does so much harm in fruit and vegetable juices, can now be destroyed.

In the year 1925, Mr. Wincenty Matzka, a well-known Polish chemist and inventor, who was living in London at the time, made a discovery which, it is claimed, is of the greatest benefit to humanity. He found that when fruit or vegetable juices are passed slowly between different metals, set closely to one another, by a special thermo-coupling arrangement, a reaction between these metals is set up which has the effect of destroying the bacteria of fermentation, putrefaction and disease. These juices may then be kept in this natural form for an indefinite period, and can be transported. No added preservative is required.

It was first thought that the reaction described above was of an electrical nature only, but further study on the part of the discoverer and of American and German Scientists, has indicated the existence of a natural force, previously unknown, which was claimed as the Oligo-Dynamic action of Metals, supposed to be the action by which noble metals act as 'Cosmic Ray' condensers. The metals used cannot be attacked by fruit juices; consequently no metallic taste is found in the latter.

The first cost of a *Matzka* System installation is very moderate, and the cost of operating per gallon is so low as to be almost negligible, as the passage of the liquid through the apparatus, occupying about 6 minutes, is affected by gravity.

Great things are looked for with the help of the process from pineapples.

There are probably many people who do not know much about the amazing health value of fruit, and who would be surprised to hear that pineapples could be considered as anything more than a very delicious and rather extravagant luxury. The truth is that the curative properties of pineapple are marvellous, and how infinitely more palatable than some obnoxious drug which one's instinct revolts against and is only taken under strong protest.

Pineapple juice is a valuable antiseptic, especially useful in all cases of toxic poisoning. In addition to cleansing and purifying, it is also a restorative of nervous energy and builds up tissue. Sufferers from tonsillitis should squeeze the juice from a thick slice of the fruit, take half as a gargle, and drink the remaining quantity as the most delicious and health-giving cocktail in the world.

We have always considered that bananas could be made to yield an attractive juice, provided the juice can be kept free of ferments, etc., leaving the 'cake' for consumption by humans or stock. Could such a thing be done by the *Matzka* process?—*Tropical Life*, May 1931.

Bees travel 40,000 Miles to make Pound of Honey. A 16-ounce jar of honey, no matter how good, is hardly worth a 40,000-mile journey. Yet that is the total distance travelled by many bees to provide the nectar necessary for just that amount of honey, according to C. B. Gooderham, apiarist of the Dominion Government.

Mr. Gooderham has figured it out mathematically. A honey-bee weighs approximately only $\frac{1}{5000}$th of a pound, and during the honey flow, on each trip she carries approximately half her own weight of nectar. It therefore requires approximately 10,000 flights to gather a pound of nectar. Furthermore, Mr. Gooderham states, nectar loses about half its weight through evaporation.

Taking all this into consideration, as well as the fact that each return flight averages about 2 miles, it is figured that bees have travelled at least 40,000 miles to provide 16 ounces of honey.

So, it is no wonder that the little honey-bee unlucky enough to be born in summer, lives but a brief six weeks. Bees born after this summer rush, have an average life of seven months.—*Scientific American*, May 1931.

Fertilizer Nitrogen from Synthetic Ammonia. For over ten years, Congress has been trying to decide what to do with the nitrate plants built during the War, at Muscle Shoals. It has been evident that if the plants were operated, the nitrate so produced would be available for fertilizers to replace the natural sodium nitrate imported from Chile. Fortunately, chemical technology moves more swiftly than Congress and it begins to appear now that by the time a decision is reached on the Muscle Shoals

question, sodium nitrate will have been superseded by ammonia as the nitrogen-bearing constituent of artificial fertilizer. This change is due to the recent development of a process for the synthesis of ammonia from the nitrogen of the air, making anhydrous ammonia available at commercial prices.

According to F. J. Keenen, in a recent issue of the *DuPont Magazine*, the production of artificial fertilizer in this country last year amounted to eight million tons containing approximately 800,000 tons of phosphate and 300,000 tons each of nitrogen and potash. Natural-occurring Chilean nitrate is being rapidly replaced by nitrogen obtained from the air as ammonia. Anhydrous ammonia is 82 per cent. nitrogen and is therefore the most concentrated form of fixed nitrogen known, which means low transportation costs.

About half the fertilizer tonnage produced in this country is known as superphosphate, produced by the action of Sulphuric Acid on phosphate rock. Because of its acid properties, superphosphate absorbs ammonia and combines chemically with it rapidly up to 5 or 6 per cent. ammonia. The first reaction occurring when ammonia is added to superphosphate, is the neutralization of the free acid present. This eliminates the rotting action of the free acid on fertilizer bags, heretofore a nuisance. Also the tendency to cake is to a great extent removed. Ammonia further acts upon the superphosphate to produce dicalcium phosphate, mono-ammonium phosphate, ammonium sulphate and a new form of phosphate which is called 'precipitated tricalcium phosphate.' The exact chemical composition of this new material is not yet known but it is almost identical in behaviour with bone meal phosphate. The fertilizing value of these materials is very high, because all are water-soluble and hence readily assimilable by plants.

The technique of adding nitrogen to commercial fertilizers in this new convenient form is very simple. Anhydrous ammonia is pumped from a tank-car through a measuring tank and thence into a mixer where the ammonia is thoroughly stirred into the superphosphate. Since the fertilizer manufacturers mix their materials in the same equipment, anyway, the application of ammonia does not necessitate an extra handling of the materials and an improved plant food is thus produced at no extra cost. —*Scientific American*, May 1931.

A New Milk Record. A new English record for yearly production by a short-horn cow has been set up by Dumpling, in the herd of Mr. John Day at East Pennard, Shepton Mallet. Since calving on February 24th 1930, this cow has yielded 30,009¾ lb. in 354 days, her total production in less than a year being approximately 20 times her own bodily weight. Her highest daily production—113¼ lb., which she gave on three occasions in April last—was a world's record for her breed. She has been recorded in Mr. John Day's herd since April, 1919, and to date she has bred ten calves, and yielded a total of 148,355¾ lb. of milk. Her record-breaking yield has been supervised by the Somerset and North Dorset Milk Recording Association. Throughout her lactation she has been fed four times daily and milked thrice, at 6–30 A.M., 2 P.M., and 5 P.M.—*The Veterinary Record*. March 14, 1931.

Correspondence—Queries and Answers

I

Cashewnuts

To

The Editor, The Madras Agricultural Journal.

Dear Sir,

Will you kindly let me know the name and address from where I can get disease-free seeds or seedlings of cashewnuts—and what would be the rate per 1000 ?

If there are any pamphlets on the subject of cashewnut cultivation and drying for export published by the Agricultural Department, will you kindly let me know the number and title along with price of same.

Thanking you,
Yours faithfully,
S. F. VICCAJEE.

10, RUE ST. LOUIS,
PONDICHERRY,
April 28, 1931.

II

Manures

To

The Editor, The Madras Agricultural Journal.

Dear Sir,

I am a subscriber to your journal. In No. 2 part your journal gives some facts and figures, regarding sugar-cane cultivation.

1. I would like to know whether any of the fertilizers, advertised in your journal and other places can be used; if so which is the best and what quantity may be used for one acre.

2. I would be glad if you can give me information about (*a*) growing of pomegranates; and how we can prevent beetle spoiling the fruits; (*b*) how to begin a coconut plantation and what manure should be used and (*c*) what is the best manure for plantains and how to apply same.

Yours etc.,
K. R. SUBRAHMANIA AYYAR.

SALEM,
May 10, 1931.

III

Sindewahe Furnace and quality of Jaggery

To

The Editor, The Madras Agricultural Journal.

Dear Sir,

The keeping quality of jaggery is found, among others, in ryots' experience influenced by the type of furnace and the nature of fuel used. In the Sindewahe furnace which the department has been popularising for a long time, sugar-cane trash and megass are used to boil down sugarcane juice for the manufacture of jaggery. Jaggery so obtained by the use of

megass and trash as fuel, is found lacking in keeping qualities as compared with that got in the local furnace by using logs of wood as fuel. In Cherlopalle, a village in Vayalpad Taluk of Chittoor District, Sindewahe furnaces which were once common have been replaced by the local furnaces on this account. There was a similar complaint in Ekilaspuram, a village in Tirupathur Taluk of North Arcot District. The ryots' contention whether sound or not, cannot be ignored and needs investigation.

It is well known at any rate to many Indians that food cooked over kerosene stove, charcoal stove and wood stove exercises different influence over the system of the consumer. The caloric values of different fuels are varying and these may have influence on the quality of food cooked. It seems to me that the problem might be investigated by preparing jaggery by using megass alone, trash alone, and logs of wood alone and testing the same for its keeping qualities; the calorific values of the above fuel also might be determined.

I shall be glad if you and the numerous readers of your valuable journal could throw some light on the points raised.

ST. THOMAS' MOUNT,
May 7, 1931.

Yours etc.,
R. SWAMI RAO.

III

Power-Crushing of Sugar-cane

To

The Editor, The Madras Agricultural Journal.

Dear Sir,

I read with much interest the reply to Mr. A. R. Nagappa Gounder's query about Power-Sugar-cane-crushing in your journal of May 1931. A power-sugar-cane-crushing plant having been in use these twenty-five years on my farm I feel that my experience would be of some interest to such of your readers as are interested in the subject.

The mill, a three-roller one, with 12″ x 18″ rolls was being driven by a 10½ B.H.P. Hornsby oil engine till recently, is now driven by a 10 H.P. Electric Motor. The mill is capable of crushing slightly over one ton of cane per hour, the extraction being 72 to 75 per cent. The makers of the mill are A. & W. Smith & Co., of Glasgow. The juice is boiled in two rectangular pans (6′ x 4′) arranged in ascending series on a *begasse* fire and the resulting syrup finished in a circular copper pan on a separate fire, wood fuel being used in this furnace. To keep the mill going continuously, four such units are in use. The mill starts grinding at 2 a.m. and works till 4 p.m. During the above period 48 pan fulls of juice (about 600 lbs. per pan) are expressed, the total output of jaggery being about 200 maunds of 28 lbs. per day. On an average, 25 acres of cane are grown on the Estate and the crop is roughly crushed in 50 days or so. A longer grinding season than 50 days is not convenient as it interferes with other farm operations. The quality of the juice is also, to some extent, affected by the over-ripening of the cane, to overcome which the planting will have to be adjusted, and so on.

The labour required to run the factory is as follows:—one driver, one oiler, five men to feed the mill, six women to carry the *begasse* from the mill to the drying floor working by turns as the mill runs continuously for 14 hours, eight firemen, four jaggery boilers, six men to help in lifting pans and doing sundry work in the factory, one watchman, one writer, forty men to cut and bundle cane in the field and load in carts, four carts to transport the cane, one field overseer, and eight women to collect the cane tops for planting.

Power consumption per day being about 80 units including the lighting of the factory, the rate per unit being one anna.

OOCOGHALLY ESTATE,
BIDARI P.O.,
May 28, 1931.

Yours etc.,
N. KRISHNA IYENGAR.

IV

Storage of Farmyard Manure

To

The Editor, The Madras Agricultural Journal.

Dear Sir,

Apropos the bulletin leaflet No. 24, dated April 6, 1931, by Mr. V. Muthuswami Ayyar, will you favour me with answers to the following queries:—

In the district of Tanjore which is mostly paddy-growing, farmyard manure is stored in pits near the cattle sheds under some shady trees. Much of the urine of the cattle is soaked in the cattleshed, or in the yard adjacent to it. Very little is absorbed by the litter. The dung and the litter is removed daily, and dumped into the pit. It is not protected from rain. A heavy rainfall fills the pit, and overflows. In May and June, all this stuff is carted to the fields, and dumped in heaps, and spread there, either before water is let in, or after, as it suits the convenience of the farmer. When removed from the pit, the stuff is not quite dry. The farmer says carts cannot get into the fields after the channels begin to receive their supplies, and as it takes some days to cart the manure, he has to dump it a few days before the fields are flooded. Now, while in the field, such of the urine as there is, is dried up; the other matter also gets dry and even the strong smell disappears by the time the field is watered. I think the farmer is right in the statement that he cannot carry the manure to the field just before letting in the water. The farmer says a field thus 'manured' gives a better yield than one not so treated. The question now is, 'Is there any manurial value gained by dumping the stuff in the field?'

There is the usual practice of penning herds of cattle or flocks of sheep and goats in fields during the months of April, May and June. The dung dropped is generally spread in the fields to prevent people from picking up the dry lumps. The urine evaporates and the dung etc., dries up. This penning costs a decent sum; the owner of herds and flocks levies a fee at so much per hundred heads. Is there any manurial value, and what may roughly be taken as its value?

MAYAVARAM,
May 28, 1931.

Yours etc.,
RAO BAHADUR C. S. SUBRAHMANYAM.

Rapid Propagation of Canes by Short-cut Method

To

The Editor, Madras Agricultural Journal.

Dear Sir,

In Palur Agricultural station report for 1929–30 it is stated under the heading 'Sugar-cane—Rapid propagation method in Palur' that 12 cents planted in February gave setts enough for 42 cents is August, from this area 25,955 setts were obtained in March enough to plant 2·25 acres or 18·5 times the original area.' From the experience gained recently, I believe, it is erroneous to think that it is a rapid propagation method. The 12 cents if left uncut till March, will give setts exactly enough to plant 2·25 acres. By this short-cut method, we are not rapidly increasing the area. Recently a plot of 25 cents of J. 247 which was planted in March 1930 was cut in March 1931 and the whole crop (except for one boiling) was used for setts. It produced 56,000 setts which planted 4·50 acres. It is 18 times the original area. If the canes used for one boiling were also utilised for setts, they would have planted a slightly larger area. I do not therefore think that by such short-cut method, we are rapidly propagating.

Yours etc.,
M. GOPALA CHETTI

FARMING CALENDAR FOR THE COIMBATORE DISTRICT
July-August (Tamil Adi)

NOTE.—(*The farming calendar in this issue of the Journal refers to July-August and not to the month of July alone and this procedure will be followed in the future notes as well; for it is felt that a description of the farming practices according to the Indian Calendar months is more in keeping with the actualities of farming. For obvious reasons therefore the calendar that appears in this issue relates to July and the first part of August.*)

July-August is the most important agricultural month in the Tamil Districts. 'ஆடிப்பட்டம் தேடிவிதை' is a proverb current amongst all Tamilian farmers. It means 'Be eagerly awaiting the right season of the month of *Adi* and sow your crops.'

The monsoon is heavy on the West Coast in the first fortnight of July and continues more or less so in the remaining part of the month as well. As a result of heavy showers in the Ghauts, the district of Coimbatore gets the benefit of the cool moist winds which blow steadily throughout the month and brings in its train light rains and often sharp showers. The total rainfall averages from 2 to 2½ inches, sufficient to moisten the soil for sowing the lands, especially in the red soil tract.

Sporadic sowings are attempted in the latter part of July, but only after the 18th of *Adi* (2nd of August) the sowings become general all over the tract.

The 18th of *Adi* (பதினெட்டாம் பெருக்கு) is a special day for the ryots of Coimbatore. It is observed as a day of festivity and rejoicing. Elsewhere in the Tamil Districts as well, this is an important day. Rivers that rise from the Western Ghauts, like the Cauveri, the Vaigai and the Thambaraparani, are in full floods. Agriculturists all along thirsting for water hail with joy the floods of the 18th of *Adi* and offer thanksgivings to God on this day.

In the backyards of houses, sowings of vegetable seeds take place on this 18th of *Adi* as it is considered very auspicious.

In the Kangayam tract a simple form of ritual is conducted in the house of the farmer by heaping the seed grains in the front of the court-yard and offering worship to them before they are taken to fields for sowing.

Dry lands are sown to *Cholam* (*Peria manjal*) in parts of the District. In Dharapuram and Erode *Cumbu* takes the place of *Cholam*. Various pulses such as Red gram, Cow gram, lab-lab, etc. are also sown as a mixture. Black soil fields are ploughed and prepared for cotton and grain crops that are sown in these areas late in September.

In garden fields late *Ragi* is planted. Early *Ragi* is hoed and weeded. Harvest of *Cholam* left over in June is finished early in July. The *Cholam* stubbles are immediately ploughed up and lands prepared for the coming Cambodia.

In wet lands, plenty of water becomes available at this period owing to the freshes in the rivers, and the transplantation of paddy goes on briskly.

Sugarcanes receive the last dose of manuring and are finally ridged up. In the Amaravathi Valley of this District and to a small extent in the Coimbatore Taluk also, sugarcanes are planted just at this time, the previous crop of sugarcane being harvested and milled simultaneously. In fact this is the second important season for cane planting in this District, the first being February-March.

Betel-vine gardeners manure their Betel-vine plantations and start sowing of *Agathi* (*Sesbania grandiflora*) in fresh fields. *Agathi* plants function as standards for Betel-vines to be planted in the coming November.

There is a busy outlook all over the District, and farmers and their families are fully engaged in this period in their various farming avocations.

College News and Notes

May, as usual was a dull month as far as life on the colony was concerned. With the closing of the Teaching sections for the Midsummer holidays, the students and most of the teaching staff left the premises on a well-earned holiday. The play grounds were deserted and even the Officers' Club and the Ladies' Club recorded poor attendance.

The Weather.—Coimbatore had a record weather in May, the mercury registering 102° F. in the shade—the highest on record for 20 years—on three days. Thunderstorms which used to be a pleasing feature of Coimbatore during the hot weather months, were conspicuously absent in April with the result that abnormally hot days and sultry nights were experienced in April and the first three weeks of May. On the 23rd May a welcome shower of 29 cents was received followed by another of 110 cents the next day. These had the desired effect of cooling down the atmosphere. Towards the close of May, however, we had the 'first taste' of the Monsoon, the light cool breeze accompanied by silvery clouds peeping over the Western Ghauts coming in as the forerunner of the monsoon showers.

M. A. S. U. Affairs.—An extraordinary General Body Meeting of the Union was held in the Freeman Hall on the 30th May to consider the suggestion of the Director of Agriculture to hold the Annual College Day and Agricultural Conference in December instead of July. The *pros* and *cons* of the change were very keenly discussed and it was resolved to accept the Director's suggestion and postpone the holding of the College Day and Conference to December so that they may precede or succeed the Gazetted Officers' Conference, thus enabling the Senior Officers of the Department to participate in the functions. It was also resolved to request the present office-bearers to continue in office till the General Body Meeting in December. The Managing Committee was authorised to make the necessary alterations in the rules consequent on the change and to examine the possibilities of a permanent change to December. The election of office-bearers will, therefore take place in December.

M. A. S. U. Parliament.—Three meetings have been arranged to take place in June and July. The subjects for discussion will be (1) The curtailment of paddy area in Madras, (2) The export of indigenous fertilizers from India and (3) The destruction of the prickly-pear by the Cochineal insect. It is hoped that academic discussions on these controversial subjects will be both entertaining and instructive to agriculturists.

Personal.—Mr. S. R. Srinivasa Ayyangar, Librarian, Agricultural College has been deputed to Madras to undergo the course of training for librarians arranged by the University of Madras.

Mr. S. R. Srinivasa Ayyar who had received orders of appointment as artist at the Bureau of Plant Industry, Indore, left Coimbatore early in June to join his new appointment.

The Ramasastrulu-Munagala prize.—Two candidates have entered for he competition this year. It is hoped to announce the result in July.

The Directorship of Agriculture.—The announcement of Mr. G. R. Hilson's departure on leave preparatory to retirement came as a surprise in he Agricultural Colony. The delay in the appointment of a successor has naturally given room, here as elsewhere, for wild speculations and tall gossip. The recent newspaper report that a Civilian will be appointed as Director, has yet to be confirmed by an official announcement.

University examination results.—The following is a list of successful andidates in the recent B.Sc. Ag. examinations.

Part II (Final Year).—Anantarama Rao H., Appaji Gounder V. K., Balasundaram M. L., Bhagiratha Rao K., David M. J., Durai Raj K., Govinda Menon T., Jaganatha Rao V. V., Krishnamurti T., Krishnan ., Krishna Rao D. V., Kuppamuthu K., Lakshmanan P. G., Narasimhamurti B. L., Lakshminarayanan K. S., Mohamed Ali A., Muddanna Shetty H., Narayanan N. G., Pattabhiraman T. V., Rajaratnam Chetty S., Ramachandran C. K., Ramaswami K. R., Ranga Rao G., Saptarishi K., Somayajulu P., Subramanian C. N., Tangaveiu T. K., Vaidyanathan N. S., Venkatachalam C., Venugopal K. and Virabadra Rao K.

Part I (Second Year).—Anandam S., Ananta Prabhu N., Balanna G. C., Balasubramanian T. S., Bhushanam K., Ganesamurti N., Govinda Kurup K., Govinda Panikkar K. C., Joga Rao P. V., Krishnan C. S., Krishnamurti V. G., Krishnamurti Rao S., Krishnaswami P., Muthuswamy P. N., Rajagopalan V. V., Sambasiva Rao P., Sethuramalingam M., Shanmugasundaram A., Sobhanadri N., Subbarayan T. R., Subramanya Chetty M., Subramanyam L., Sundararajan A. R., Suryanarayana R., Tejappa Shetty K., Udhobo Patnaik, Vaidhyanathan I., Vedantachari K., Venkatadri Reddi V., Venkataramanappa S., and Veeranna N.

Officers' Club.—Mr. E. C. Wood, M.A. of the Theosophical Society delivered at the Officers' Club an interesting lecture on the *Problem of Life.* The meeting was well attended.

Officers' Cricket Club.—The Agricultural Officers' Cricket Club which was inaugurated in 1925 and which during the past six years has contributed largely to the sporting life of the colony, has been incorporated with the Agricultural College Officers' Club. It is hoped that the new cricket section of this old institution will give the residents the benefit of several entertaining cricket fixtures during the ensuing season.

Visitors.—Mr. R. R. Glanville, B.A., A.R.C.S.I., Superintendent of Agriculture, Sierra Leone, who is deputed by the Department of Agriculture, Sierra Leone to study conditions of Rice culture and breeding in several tropical countries, arrived in Coimbatore early in May and after spending some days at the head-quarter station, has left Coimbatore to visit the Agricultural Research stations at Pattambi, Aduturai and Maruter.

Among other visitors to the College, were Messrs. T. Murari, Acting Deputy Director of Agriculture, Livestock, Rao Bahadur M. R. Ramaswami Sivan, Retired Principal and Mr. C. C. Chandy, Manager of the Madras branch of Messrs. Adair Dutt & Co., Ltd.

ADVISORY COMMITTEE FOR AGRICULTURAL, VETERINARY AND CO-OPERATIVE DEPARTMENTS

[We have received the following for publication in the Journal. *Ed. M. A. J.*]

G. O. No. 812—P. Development Department, dated the 28th May 1931.

His Excellency the Governor resolves to constitute an Advisory Committee on the Administration of the Agricultural, Veterinary and Co-operative Departments, with the Honourable Mr. P. T. Rajan, Minister for Public Works, as President and the following gentlemen as members :—

1. Daniel Thomas, Esq., M.L.C.
2. M. R. Ry. T. V. K. Kama Raja Pandia Nayakar Avergal, M.L.C., Zamindar of Bodinayakanur.
3. ,, H. B. Ari Gowder Avergal, M.L.C.
4. ,, A. Ranganatha Mudaliyar Avergal, M.L.C.
5. ,, K. C. M. Venkatachala Reddiyar Avergal, M.L.C., Zamindar of Minnampalle.
6. ,, A. B. Shetty Avergal, M.L.C.
7. ,, Rai Bahadur N. Nallamthambi Sarkari Manradiar Avergal, M.L.C.
8. ,, Ramakrishna Ranga Rao Sri Ravu Swetachallapathi Avergal, M.L.C., Raja of Bobbili.
9. ,, C. Indriah Avergal, M.L.C.
10. ,, Rao Bahadur R. K. Venugopal Nayudu Avergal, M.L.C.

2. The Secretary to Government, Development Department will be ex-officio member of the Committee and act as its Secretary. The Directors of Agriculture and of Veterinary Services and Registrar of Co-operative Societies may attend the meetings of the Committee.

The President may nominate to the Committee temporarily local members for the discussion of local subjects.

3. The functions of the Committee will be advisory.

Monsoon Forecast for 1931

"For the Peninsula (taken to consist of Gujarat, the Konkan, the Bombay Deccan, the Central Provinces, Hyderabad and the north Madras coast), the factors found to be of most importance are rainfall in Java, south Rhodesia and Zanzibar district, pressure in South America and the Cape and temperature at Dutch Harbour. This year the data from Java, South America, Rhodesia and Dutch Harbour are each slightly favourable, those from the Cape are slightly unfavourable, and the rainfall data from Zanzibar are more definitely unfavourable. Taken together the factors indicate that the chances are 9 to 1 that the monsoon rainfall in the Peninsula will be within 20 per cent of the average."

N.B.—(An abstract of the forecast issued by the Director-General of Observatories, Poona.)

Weather Review

MAY 1931

Rainfall data

Division	Station	Actual for month	Departure from normal	Total since January 1st	Division	Station	Actual for month	Departure from normal	Total since January 1st
Circars ...	Gopalpore ...	0	− 1·9	0·5	South ...	Negapatam...	1·3	− 0·6	13·1
	Vizagapatam.	1·8	− 0·5	3·1		Madura ...	1·4	− 1·3	4·2
	Cocanada ...	1·4	− 0·2	1·4		Pamban* ...	...	...	...
	Masulipatam*	...	...	...		Palamcottah.	0	− 1·7	1·4
Ceded Districts.	Kurnool ...	1·5	0·3	2·0					
	Bellary ...	0·8	− 1·1	1·5					
	Anantapur ...	1·6	− 0·2	1·8	West Coast	Trivandrum.	3·2	− 5·2	8·5
	Cuddapah ...	1·2	− 0·4	1·2		Cochin ...	6·9	− 0·9	18·3
						Calicut ...	6·7	− 2·8	7·4
Carnatic...	Nellore ...	1·4	+ 1·0	1·4		Mangalore ...	11·2	+ 4·8	14·0
	Madras ...	1·8	...	3·4					
	Cuddalore ...	0·4	+ 0·9	11·2					
					Mysore and Coorg ...	Bangalore ...	3·4	− 0·8	3·6
Central ...	Vellore ...	0·9	− 2·1	2·1		Mercara ...	6·5	+ 0·9	9·5
	Salem ...	2·2	− 2·6	4·0					
	Coimbatore Town ...	5·5	+ 3·1	7·3					
	Coimbatore Res. Inst. ...	2·0	− 0·2	3·6	Hills ...	Kodaikanal ...	6·5	+ 0·3	14·6
	Trichinopoly.	2·9	− 0·1	8·3		Coonoor ...	3·0	− 1·3	7·1

* Data not available.

General summary of Weather conditions :—Pressure distribution was of a normal hot weather type throughout the month, accompanied by intense hot weather conditions which prevailed over the whole area. A storm formed in the centre of the Bay after a period of unsettled weather there and developing into a storm moved rapidly in a North-easterly direction and crossed the Arakan coast between Kyaukpyu and Diamond Island on the evening of the 16th, and failed to influence the weather over the reporting area beyond causing a few thunderstorms on the 14th. The storm caused a temporary advance of the moonsoon over Burma. Conditions were getting favourable for an advance of the monsoon on the West Coast at the end of the month.

Thunderstorms were sporadic on and near the hills and in Malabar at beginning of the month, on the 14th and again towards the end of the month. Rainfall associated with these storms was however not heavy. In the middle of the month intense hot weather conditions prevailed with very high temperatures on the Coromandel Coast, Deccan and the south of the area, Nellore reporting a maximum of 114° which has been the highest temperature for this season. Day temperature was markedly above the average for the greater part of the month.

Rainfall was generally nearly normal over the whole area, being locally in excess in South Canara and the Central districts and in defect in the far north and south. The only falls of importance were 2·8″ at Kodaikanal on the 27th and a fall of 2·7″ at Coimbatore town on the 24th.

Weather report for the Research Institute Observatory:—

Absolute Maximum in shade	102°·0	
Absolute Maximum in shade	69°·0	
Mean Maximum in shade	98°·1	
Mean Minimum in shade	75°·2	
Total rainfall in month	2·02	inches
Average rainfall for May	2·16	,,
Departure from normal	— 0·14	,,
Total No. of Rainy days	3	
Mean daily wind velocity	3·1	M.P.H.
Mean 8·00 Hours wind velocity	1·3	,,
Mean humidity at 8·00 hours	66·5 %	
Total hours of sunshine	284·5	
Mean daily hours of sunshine	7·2	

Summary of weather condition:—Weather was fine and dry with high day temperatures for the greater part of the month. The mean maximum for the first week being 100° with a maximum of 102° which is the highest temperature recorded so far at this observatory.

Thunderstorms appeared at the beninning of the month but rainfall was very scanty and again at the end of the month when 1·11 inches of rain fell during a thunderstorm, the rainfall was very local since on that day no less than 2·7 inches fell at the Town observatory at a distance of three miles.

Towards the end of the month signs appeared of the approach of the monsoon with strong south-west winds and a falling barometer. The characteristic oscillations of the barometer did not occur as usual at this time of the year. Weather was very unsettled on the 29th and heavy rain seems to have fallen to the east of the observatory, though only 0·02 inch was recorded here.

P.V.R.
B.S.N.

Departmental Notifications

Gazette Notifications:—Mr. N. S. Kulandaiswami Pillai, District Agricultual Officer in charge, V Circle, to act as Deputy Director of Agriculture, V Circle with effect from the date on which Mr. M. Govinda Kidavu, went on leave preparatory to retirement Mr. K. Unnikrishna Menon, District Agricultural Officer, on return from leave, to be District Agricultural Officer in charge of IV circle vice Mr. M. Govinda Kidavu, granted leave. Mr. K. T. Bhandary, Agricultural Demonstrator and Upper Subordinate, third grade, to act as District Agricultural Officer, Tellicherry. Mr. R. Swami Rao, District Agricultural Officer, Vellore, to officiate as District Agricultural Officer in charge of IV Circle till Mr. K. Unnikrishna Menon returns from leave. Mr. C. V. Seshachari, Farm Manager and Upper Subordinate, first grade, to act as District Agricultural Officer Vellore. Mr. G. R. Hilson, Officiating Director of Agriculture, with effect from 5th May 1931 or date of relief, leave on average pay for twenty-four days and leave on half average pay for one year, three months and twenty-six days. Mr. K. Unnikrishna Menon, District Agricultural Officer in charge, VII circle, leave on average pay for two months from 18th April 1931 or date of relief. The Government are pleased to order that Mr. M. Arogyaswami Pillai, Assistant Curator, Government Botanical Gardens and Parks, Ootacamund, will be in charge of the current duties of the Curator, Government Botanical Gardens and Parks, Ootacamund, in respect of the Botanical Gardens at Ootacamund and Sim's Park at Coonoor only (in addition to his own duties) with effect from the date of taking charge from Mr. V. Narayanaswami, Systematic Botanist Mr. M. Kunhambu Nambiar, District Agricultural Officer, Madura, will be in charge of

the current duties of Deputy Director of Agriculture, VI Circle, in addition to his own, vice Mr. B. Ramiah Garu, Deputy Director of Agriculture, VI Circle, granted leave.

Promotion:—The Lower Subordinates named below are promoted to Upper Subordinate Service, Agricultural Section, in the V Grade with effect from 1—5—31: 1. P. Abdulla Hajee, 2. P. L. Narasimham, 3. B. Dasappa Malli. The Lower Subordinates named below are promoted from the V to the IV Grade with effect from 1—4—31: 1. M. S. Purnalingham Pillai, 2. S. Sitapati Rao.

D.A.'s Office Orders:—The following Upper Subordinates are transferred from the Agricultural to the Science Section with effect from 1—5—31: K. B. Visvanatham to Paddy Section; K. Narayanan Nair to Millet Section. T. G. Anandarama Ayyar, F.M., L.R.S., Hosur, to A.C. & R.I., Coimbatore, as A.L.A. in Dairying. On relief by T.G. Anandarama Ayyar, K. Gurumurti, A.L.A. in Dairying, to report himself for duty to the D.D. II Circle.

First Circle:—A. Ram Mohan Rao, F.M., Samalkot, l.a.p. for 1 month from date of relief. T. Paramanandam, A.D., Rajahmundry, extension of l.a.p. for 5 weeks.

Third Circle:—A. Krishnaswami Ayyar, A.D., Anantapur, l.a.p. for 2 days on 27th and 28th March 1931. S. Varadarajulu Naidu, A.D., Guntakkal, l.a.p. for 15 days from 9—5—31. M. Vaidyanathan, A.D., Gooty, l.a.p. for 21 days from 27—5—31.

Fourth Circle:—N. V. Kalyanasundaram, F. M., Kalahasti, l.a.p. on m.c. for 2 months from 15—4—31. K. E. Visvam Ayyar, A.A.D., Polur, l.a.p. for 3 weeks from 28—4—31. N. Krishna Pillai, A.D., Tiruvettipuram, l.a.p. for 6 weeks from 7—5—31. A. Ramaswami Ayyar, F.M., Palur, granted extension of l.a.p. for 2 months from 8—4—31 on m.c. T. V. Srinivasachariu, A.A.D., on return from leave on 4—6—31 is transferred to Conjeevaram. A. Ramaswami Ayyar, on return from leave, to report himself to D.A.O., Cuddalore. C. S. Krishnaswami, F.M., Palur, to be in charge of the Station. V. Suryanarayana, F.M., Kalahasti, on return from leave, to report himself to D.A.O., Vellore.

Fifth Circle:—T. R. Venkaswami Rao, A.D., Tiruvalur, l.a.p. for 3 weeks from 12—5—31. S. P. Fernando, A.A.D., Mannargudi, l.a.p. for 22 days from 9—5—31.

Sixth Circle:—L. Sankarkumata Pillai, A.D., Tinnevelly, l.a p. for 4 months on m.c. from date of relief. A. Ramalingha Ayyar, A.D., Srivilliputtur, l.a.p. for 6 weeks on m.c. from date of relief. V. G. Dhanakoti Raju, A.D., Ambasamudram, l.a.p. for 1 month from 8—6—31.

Eighth Circle:—P. Narayanan Nair, A.D., Annur, l.a.p. for 18 days from 30—4—31.

D.D.L.S.'s Section:—A. K. Annaswami, F.M., Chintaldevi, extension of l.a.p. by 1 month and 15 days, to join at L.R.S., Guntur. T. Seshachalam Nayudu, on completion of his training at Bangalore, to join at L.R.S., Chintaldevi, as F. M. in charge. M. C. Menon transferred from Guntur to Hosur.

Principal's Section:—V. Viswanatha Ayyar, A.F.M., Central Farm, l.a.p. for 1 month from 6—5—31. Francis Joseph, Assistant Lecturer in Animal Hygiene, l.a.p. for month and 4 days from 11—5—31. K. Sankaranarayana Ayya, Supervisor, l.a.p. for 20 days from 6—6—31.

Millets Section:—P. V. Hariharan, Assistant, V. Grade, on probation, is confirmed in his appointment with effect from 13—5—29. U. L. Srinivasa Rao, A.F.M., l.a.p. for one moth from 25—5—31.

C. S.'s Section:—T. V. Rangaswami, Assistant, l.a.p. for 9 days from 14—5—31. G. Seshadri Ayyangar, Asst., l.a.p. for 1 mouth from 15—5—31. M. S. Purnalingham Pillai, Sub-Asst., l.a.p. for 1 month and 24 days from 8—6—31. S. Mayandi Pillai, Asst., l.a.p. for 1 month and 2 days from 18—5—31. Assistant P. Gopalaratnam and fieldmen C. H. Krishnan and V. Srinivasa Ayyangar, transferred to Guntur to take up Cotton work at the Lam Farm.

P. S.'s Section:—V. Krishnaswami, Asst., A.R.S., Aduturai, l.a.p. for 15 days from 8—5—31. C. Rajasekhara Mudaliar, Asst., A.R.S., Pattambi, extension of l.a.p. for 14 days from 3—5—31. A. Gulam Ahamed, Asst., to the C.S., now in training at the P.B.S., Coimbatore, l.a.p. for 21 days from 22—5—31. R. Subbia Gounder, Sub-Assistant, l.a.p. for one week from 1—6—31. P. Uttaman, Assistant, A.R.S., Pattambi, l.a.p. for 20 days from 30—5—31.

G. M's. Section:—C. S. Gopalaswami Rao, Assistant, extension of l.a.p. for 3 months from 8—5—31.

G. A. C.'s Section:—G. Ganapathi Ayyar, Assistant, l.a.p. for 16 days from 21—5—21. T. Varahalu, Assistant, A.R.S., Anakapalli, l.a.p. for 1 month from 6—5—31. T. S. Ramasubramania Ayyar, l.a.p. for one month from 21—5—31.

G. S. B.'s Section:—J. David, Sub-Asst., l.a.p. on m.c. from 24—4—31 to 30—5—31.

G. E. Section:—N. Krishna Menon, Sub-Assistant, extension of l.a.p. on m.c. for 3 weeks. T. Alwar Ayyangar, artist, l.a.p. for one month from 7—5—31.

Oilseed Specialist's Section.—C. M. John, Assistant, l.a.p. for 1 month and 5 days from 30—5—31.

APPENDIX

ADDITIONS TO THE LIBRARY DURING MARCH, 1931

A. BOOKS

1.	*The Book of Electrical Wonders* ...	By Hawks, E.	...	...
2.	*Short Stories in Science*	,, Growther, J. G.	...	...
3.	*How a Tree Grows*	,, Somerville	...	...
4.	*Recent Economic Developments in Russia.*	,, Leites, K.	...	...
5.	*This Bonday—A Study of the Migration of Birds, Insects and Aircraft with some Reflections on Evolutions and Relativity.*	,, C. B. Howorth	...	...
6.	*Farm Measurements*	,, Ruston, A. G., and Dawe, C. V.		...
7.	*Popular Research Narratives—Vol. III.*	,, Flinn, A. E.	...	...
8.	*A short History of British Agriculture.*	,, Orr, J.	...	...
9.	*Science and the New Civilization* ...	,, Millikan, R. A.	...	...
10.	*Men who found out—Stories of Great Scientific Discoverers.*	,, William Ellis, A.	...	...
11.	*Modern Science*	,, Thomson, J. A.	...	...
12.	*The Rythms of Life*	,, Fraser Harris, D. F.	...	...
13.	*Agricultural Drawings and the Design of Farm Structures.*	,, French, T. S., and Iwis., F. W.		...
14.	*Veterinary Studies for Agricultural Students.*	,, Reynolds, M. H.	...	...
15.	*Special Pathology and Therapeutics of the diseases of the domestic Animals.*	,, Haytra and Mark	...	...
16.	*Infectious Diseases—Vol. I.*	.. ...		...
17.	*Diseases of the Digestive Organs, Respiratory Organs and Circulatory Organs—Vol. II.*	... ..		...
18.	*Diseases of the Urinary Organs, Blood and Blood Producing, Organisms Spleen Metabolism nervous System, etc.*	.....		...
19.	*Farm Calculations and Accounts* ...	,, Ruston, A. G., and Dawe, C. V.		1926
20.	*The English Land System* ...	,, Marriot	...	1914
21.	*The Land and the Empire* ...	,, Christopher Turner	...	1917
22.	*Common Sense Economics* ...	,, Mesurier, L. L.	...	1926
23.	*Labour and Capital after the War* ...	,, Chapman	...	1918
24.	*America's Search The Causes of Economic Success.*	,, Perker	...	1927
25.	*Use of Water in Irrigation* ...	,, Fortier	...	1926
26.	*The lower Fungi—Phycomyeetes* ...	,, Fitzpatrick, H. M.	...	1930
27.	*The future of Farming*	,, Orwin, C. S.	...	1930
28.	*Philosophy of a Biologist*	,, Rill, H.	...	1930
29.	*Principles of Genetics*	,, Sinnot and Dunn	...	1925
30.	*Hereditary Livestock*	,, Wriedt, C.	...	1930
31.	*Field Crops of South Africa* ...	,, Leppan, H. D., and Bosman.		1923
32.	*The Genetical Theory of Natural Selection.*	.....		1930
33.	*Outlines of Fungi and Plant Diseases.*	,, Bennet, F. T. ..		1924
34.	*Genetics in Relation to Agriculture* ...	,, Babcock and Clanson .		1927
35.	*Principles of Genetics*	,, Sinnot and Dunn	...	1925
36.	*The Chemistry of Plant Life* ...	,, Thatcher	...	1921
37.	*A Junior Course of Practical Zoology.*	,, Marshall and Hush	...	1930
38.	*Monocotyledons*	,, Arber, A ...		1925
39.	*Pastures of Wonder*	,, Cassius Jackson Keyber		1929
40.	*English Field System*	,, Howard lein Gray ...		1915
41.	*Plant Physiological Chemistry* ...	,, Harvey, R. B. ...		1929
42.	*A discretionary of Color*	,, Maerz, A., and Paul, M. rea.		1930
43.	*Laboratory Manual of Elementary Colloid Chemistry.*	,, Hatscheck, E. ...		1926
44.	*Plant Respiration*	,, S. Kostychew ...		1927
45.	*Chemistry of the Proteins and its Economic Applications.*	....		1926
46.	*How to Teach General Science* ...	,, Frank, J. O. ...		1926
47.	*The Plant Alkaloids*	,, Henry, T. A. ...		1924
48.	*Environments and Plant Developments.*	,, Laudegardh ...		1931
49.	*A Study of the Oceans*	,, Johnstone, J. ...		1930
50.	*The Changing World Wheat Situation—Vol. VI No. 10.*	.....		1930
51.	*Volumetric Analysis—Vol. II* ...	,, Kolthoft, I. M. ...		1929
52.	*The Principles and Practice of Judging Livestock.*	,, Gay, C. W. ...		1920
53.	*The Newer Knowledge of Nutrition* ...	,, McColleon ...		1929
54.	*A Course of Practical Chemistry for Agricultural Students—Vol. I.*	....		1921
55.	Do. do. *Vol. II.*	....		1923
56.	*The Breeding of Animals* ...	,, Mamford ...		1926
57.	*Farm Equipment for Mechanical Power.*	,, Kranieh ...		1923
58.	*The Epidemiology and Control of Malaria in Palestine.*	,, Kligler ...		1930
59.	*The Theory of the Gene* ...	,, Inorgan, T. H. ..		1929

B. MEMOIRS, BULLETINS, Etc.

U.S. Department of Agriculture—Farmer' Bulletins—

1.	The Control of Moths in Upholstered Furniture ...		*No.* 1655
2.	Insects of the Pecon and how to combat them ...		,, 1654
3	Sweetclover in corn belt Farming		,, 1653
4.	Diseases and Parasites of Poultry		,, 1652
5.	The Corn Ear Worm as an enemy of field corn in the Eastern States.		,, 1651
6.	The Gypsy Moth and the Brown Tail Moth ...		,, 1623
7.	Homes for Birds		,, 1456
8.	Red squill powder in Rat Control	*Leaflet*	,, 65
9.	Seasonal Hints from the Dominion Experimental Farms.	,,	,, 50
10.	Seasonable Hints from the Dominion Experimental Farms, Eastern and B. C. Edition ...	,,	,, 50

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Technical Bulletins—

18.	Respiration and Shelled Corn	*Bulletin No.* 3
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99.	Marketing Fluid Milk in four Virginia Cities ...	,,	275

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100.	Influence of soil conditions, Fertilizer treatments and Light intensity on Growth, Chemical Composition and Enzymic Activities of Sugar Beets.	*Technical No.* 108	
101.	Investigations of Corn Borer Control at Monroe ...	*Special Bulletin No.* 204	

Reprint from Journal, Agriculture Research, Washington. Vol. 41 No.

102.	Water soil Temperatures and their Relations to Subterranean Insect survival.	*Vol.* 41, *No.* 8	

Food Research Institute, California

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104.	Fifteenth International Congress of Agriculture, Prague, Czechoslovakia, Official.	*Bulletin*	*No.* 1
105.	Fifteenth International Congress of Agriculture, Prague, Czechoslovakia, Official.	,,	2
106.	Imperial Institute of Agricultural Research, Pusa. Scientific Reports 1929–30.	.....	
107.	Report of the Agricultural Department, Bihar and Orissa. April 1929 to March 1930.	.....	
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25. Administrative Reports, Co-operative Societies, 1929-30. .....
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39. Annual Report of the Department of Agriculture in the Bombay Presidency for the year 1929-30. .....
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ERRATA

Vol. xix, No. 5, (May 1931)

P. 216, 4th para. 3rd line, *for* ' ten spoonful ' *read* ' two spoonful '.
P. 234, 3rd para, 3rd line, *for* ' plodded ' *read* ' flooded '.

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